

EOS Production Sites Network Performance Report: April 2014

This is a monthly summary of EOS network performance testing between production sites -- comparing the measured performance against the requirements. **Significant improvements are noted in Green, Network problems in Red, System problems and Requirements issues in Gold, Issues in Orange, and other comments in Blue.**

Highlights:

- **Mostly stable flows**
 - **GPA: 3.84 ↑ New All-time High!** (was 3.82 last month).
- **Requirements:** from the Network Requirements Database
- **Only 1 flow below Good**
 - **GSFC → EROS: Adequate**

Ratings Changes:

Upgrade: ↑: GSFC → EROS: Almost Adequate → Adequate
 ▪ (Slight improvement)

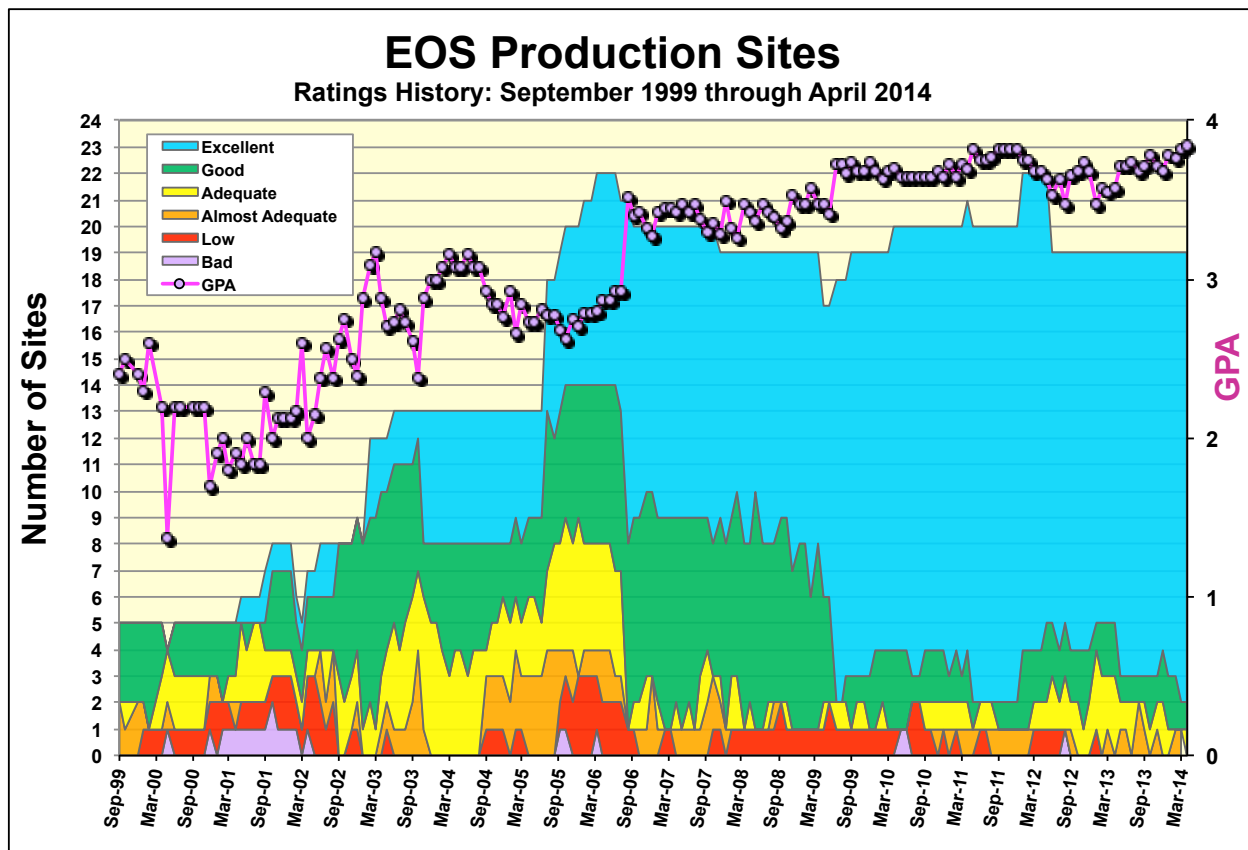
Downgrades: ↓: None

Ratings Categories:

Rating	Value	Criteria
Excellent:	4	Total Kbps > Requirement * 3
Good:	3	1.3 * Requirement <= Total Kbps < Requirement * 3
Adequate:	2	Requirement < Total Kbps < Requirement * 1.3
Almost Adequate:	1.5	Requirement / 1.5 < Total Kbps < Requirement
Low:	1	Requirement / 3 < Total Kbps < Requirement / 1.5
Bad:	0	Total Kbps < Requirement / 3

Where Total Kbps = Average Integrated Kbps (where available), otherwise just iperf

Note that “**Almost Adequate**” implies meeting the requirement excluding the usual 50% contingency factor.

Ratings History:

The chart above shows the number of sites in each rating category since EOS Production Site testing started in September 1999. Note that these ratings do NOT relate to absolute performance – they are relative to the EOS requirements.

Additions and deletions:

- 2011 April: Added RSS to GHRC
- 2011 May: Deleted WSC to ASF for ALOS
- 2012 January: Added NOAA → GSFC-SD3E
Added GSFC-SD3E → Wisconsin
- 2012 June: Deleted GSFC → LASP
Deleted GSFC ← → JAXA

Requirements Basis:

In June 2012, the requirements have been switched, as planned for quite a while, to use the EOSDIS network requirements database. EOSDIS has been reviewing its network ICD's with each of the instrument teams. These ICDs are now essentially completed, and the database has been updated with the ICD values, so those values are now used here.

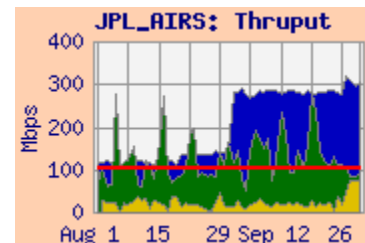
Previously, the requirements were based on the EOS Networks Requirements Handbook, Version 1.4.3 (from which the original database requirements were derived). Prior to that, the requirements were derived from version 1.4.2.

One main difference between Handbooks 1.4.2 and 1.4.3 is that in 1.4.3 most flows which occur less than once per day were averaged over their production period. These flows were typically monthly Level 3 data transfers, which were specified to be sent in just a few hours. However, they could easily be accommodated either between the per-orbit flows, or within the built-in contingency. Previously, these flows were added in linearly to the requirements, making the requirements unrealistically high.

Additionally, the contingency for reprocessing flows greater than 2X reprocessing was reduced. These flows WERE a major component of the contingency, so adding additional contingency on top of these flows was considered excessive.

Integrated Charts:

Integrated charts are included with site details, where available. These charts are "Area" charts, with a "salmon" background. A sample Integrated chart is shown here. The yellow area at the bottom represents the daily average of the user flow from the source facility (e.g., GSFC, in this example) to the destination facility (JPL, in this example) obtained from routers via "netflow". The green area is stacked on top of the user flow, and represents the "adjusted" daily average iperf throughput between the source-destination pair most closely corresponding to the requirement. This iperf measurement essentially shows the circuit capacity remaining with the user flows active. Adjustments are made to compensate for various systematic effects, and are best considered as an approximation. The red line is the requirement for the flow from the source to destination facilities. On some charts a blue area is also present – usually "behind" the green area – representing adjusted iperf measurements from a second source node at the same facility.

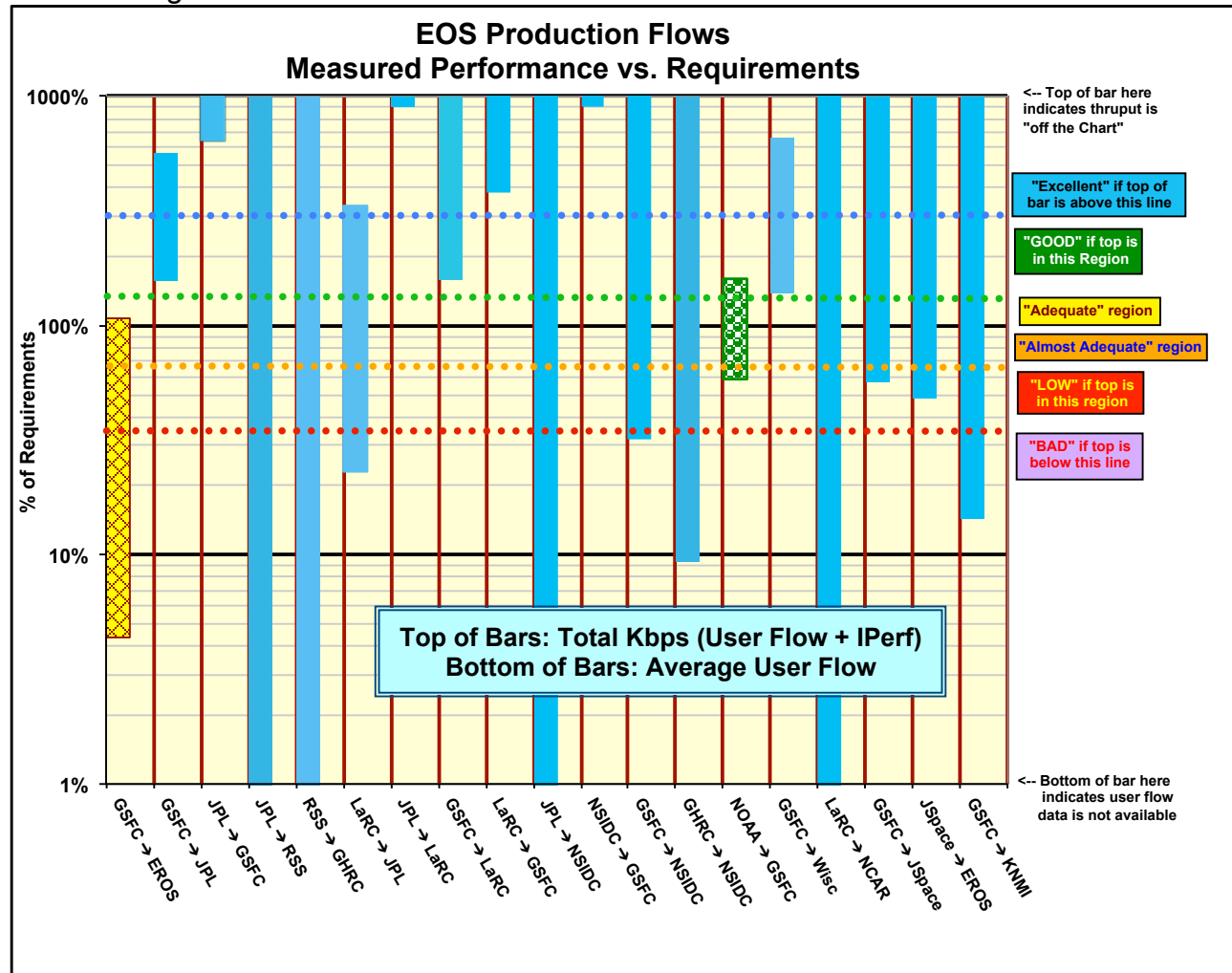


Network Requirements vs. Measured Performance

April 2014		Requirements (mbps)		Testing				Ratings	
Source → Destination	Instrument (s)	Current	Old	Source → Dest Nodes	Average User Flow mbps	iperf Median mbps	Integrated mbps	Ratings re Database Requirements	
		Database	HB 1.4.3+					This Month	Last Month
GSFC → EROS	MODIS, LandSat	548.4	342.9	MODAPS-PDR → EROS LPDAAC	23.9	582.7	590.7	Adequate	A A
GSFC → JPL	AIRS, MLS, NPP, ISTs	63	116.7	NPP SD3E OPS1 → JPL-AIRS	99.0	345.9	357.0	Excellent	Ex
JPL → GSFC	MLS	0.57	0.6	JPL-PODAAC → GSFC GES DISC	3.7	305.5	305.6	Excellent	Ex
JPL → RSS	AMSR-E	0.16	0.5	JPL-PODAAC → RSS (Comcast)		30.4		Excellent	Ex
RSS → GHRC	AMSR-E	0.32	0.34	RSS (Comcast) → GHRC (NISN)		3.17		Excellent	Ex
LaRC → JPL	TES, MISR	83.5	69.3	LARC-ASDC → JPL-TES	19.3	278.6		Excellent	Ex
JPL → LaRC	TES	1.1	1.5	JPL-TES → LARC-PTH	15.0	168.4		Excellent	Ex
GSFC → LaRC	CERES, MISR, MOPITT, TES, MODIS	52.2	31.3	GSFC EDOS → LaRC ASDC	83.1	895.5	897.4	Excellent	Ex
LaRC → GSFC	MISR	0.6	0.4	LARC-ASDC → GES DISC	2.10	933.5	933.5	Excellent	Ex
JPL → NSIDC	AMSR-E	0.16	0.2	JPL-PODAAC → NSIDC		455.5		Excellent	Ex
NSIDC → GSFC	AMSR-E, MODIS, ICESAT	0.017	0.6	NSIDC DAAC → GES DISC	1.30	817.1	817.1	Excellent	Ex
GSFC → NSIDC	AMSR-E, MODIS, ICESAT	8.42	27.6	MODAPS PDR → NSIDC-DAAC	2.69	542.7	542.7	Excellent	Ex
GHRC → NSIDC	AMSR-E	0.46	0.5	GHRC → NSIDC DAAC	0.04	13.8	13.8	Excellent	Ex
NOAA → GSFC	NPP	522.3	615.6	NOAA-PTH → GSFC NPP-SD3E OPS1	305.4	776.5	836.6	Good	Good
GSFC → Wisc	NPP, MODIS, CERES, AIRS	259.1	253.7	GSFC NPP-SD3E OPS1 → WISC	357.2	1685.0	1707.4	Excellent	Ex
LaRC → NCAR	MOPITT	0.044	0.1	LaRC-PTH → NCAR		146.6		Excellent	Ex
GSFC → JAXA	TRMM, AMSR-E, MODIS, GPM	3.51	0.1	GSFC-EBnet → JAXA	13.0	n/a		n/a	n/a
JAXA → GSFC	AMSR-E, GPM	0.16	0.1	JAXA → GSFC-EBnet	2.11	n/a		n/a	n/a
GSFC → JSpace	ASTER	6.75	5.4	GSFC-EDOS → JSpace-ERSD	3.85	177.4	180.1	Excellent	Ex
JSpace → EROS	ASTER	8.3	8.3	JSpace-ERSD → EROS PTH	4.03	170.1	170.1	Excellent	Ex
GSFC → KNMI	OMI	13.4	0.03	GSFC-OMISIPS → KNMI ODPS	1.92	274.0	274.0	Excellent	Ex
		Significant change from HB v1.4.3 to Requirements Database				Ratings Summary			
		Value used for ratings				Database Req			
						Score Prev			
*Criteria:	Excellent	Total Kbps > Requirement * 3				Excellent	17	17	
	Good	1.3 * Requirement <= Total Kbps < Requirement * 3				Good	1	1	
	Adequate	Requirement < Total Kbps < Requirement * 1.3				Adequate	1	0	
	Almost Adequate	Requirement / 1.5 < Total Kbps < Requirement				Almost Adequate	0	1	
	Low	Requirement / 3 < Total Kbps < Requirement / 1.5				Low	0	0	
	Bad	Total Kbps < Requirement / 3				Bad	0	0	
						Total Sites	19	19	
Notes:	Flow Requirements include: TRMM, Terra, Aqua, Aura, ICESAT, QuikScat, GEOS, NPP					GPA	3.84	3.82	



This graph shows a bar for each source-destination pair – relating the measurements to the requirements for that pair. The bottom of each bar represents the average measured user flow from the source site to the destination site (as a percent of the requirement) – it indicates the relationship between the requirements and actual flows. Note that the requirements generally include a 50% contingency factor above what was specified by the projects, so a value of 67% (dotted orange line) would indicate that the project is flowing as much data as requested. The top of each bar similarly represents the integrated measurement, combining the user flow with Iperf measurements – this value (when available) is used to determine the ratings.



1) EROS:

Ratings: GSFC → EROS: **Almost Adequate** → **Adequate**
 ERSDAC → EROS: Continued **Excellent**

Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/EROS.shtml>
http://ensight.eos.nasa.gov/Organizations/production/EROS_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODAPS-PDR → EROS LPDAAC	809.7	582.7	294.5	23.9	590.7
GSFC-EDOS → EROS LPDAAC	424.3	376.5	119.5		
GES DISC → EROS LPDAAC	632.4	483.4	235.5		
GSFC-ENPL → EROS LPDAAC	874.5	859.5	833.5		
JSpace-ERSD → EROS LPDAAC	280.8	170.1	72.0	4.0	170.1
NSIDC SIDADS → EROS PTH	920.0	915.2	839.5		
GSFC-ENPL → EROS PTH	2300.0	2252.5	2090.0		
GSFC-ENPL → EROS PTH (IPv6)	n/a	n/a	n/a		
GSFC-NISN → EROS PTH	819.0	646.0	229.5		
ESDIS-PS → EROS PTH	840.5	726.4	351.3		
LaRC PTH → EROS PTH	169.2	155.3	117.9		

Requirements:

Source → Dest	Date	mbps	prev	Rating
GSFC → EROS	CY '12 -	548.4	343	Almost Adequate
ERSDAC → EROS	FY '06 -	8.33	8.3	Excellent

Comments: **1.1 GSFC → EROS:** The rating is based on the **MODAPS-PDR** Server to EROS LP DAAC measurement, since that is the primary flow. The requirement was increased 60% in June '12, switching to the requirements database, based primarily on increased MODIS reprocessing. The average user flow this month was again only about 4% of the new requirement.

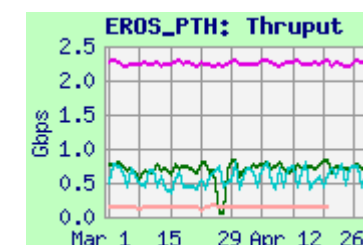
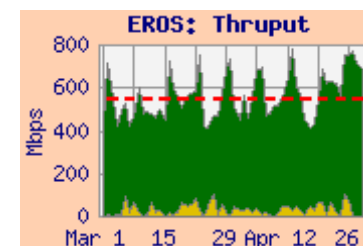
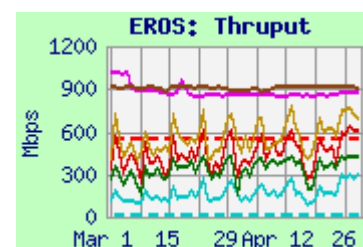
The integrated thrupt from **MODAPS-PDR** to LPDAAC was noisy but mostly stable, with the median now slightly above the requirement, so the rating improves to **Adequate**. Thrupt from **GSFC-EDOS** and **GES DISC** (also on EBnet) also increased slightly. The route from EBnet sources is via the Doors, to the NISN 10 gbps backbone, to the NISN Chicago CIEF, then via GigE, peering at the StarLight Gigapop with the EROS OC-48 tail circuit.

Iperf testing for comparison is performed from **GSFC-ENPL** to both LPDAAC (the "FTL" node, outside the EROS firewall) and to EROS-PTH (both 10 gig hosts) using both IPv4 and IPv6. The route from **GSFC-ENPL** to EROS is from GSFC via a direct 10 gig connection to the MAX, to Internet2, to StarLight in Chicago. **GSFC-ENPL** (IPv4) to EROS-PTH now typically gets over 2 gbps. This shows that the capacity of the network is well in excess of the requirement – it would be rated **Excellent**. **GSFC-ENPL IPv6** tests have been failing since February after they were restored in December.

1.2 JSpace-ERSD → EROS: **Excellent**. See section 9 (ERSD) for further discussion.

1.3 NSIDC → EROS-PTH: Performance has been stable since mid December.

1.4 LaRC → EROS-PTH: The thrupt from **LaRC-PTH** to EROS-PTH was very stable. The route is via NISN SIP to the Chicago CIEF to StarLight – similar to EBnet sources. Note that **LaRC-PTH** outflow is limited to 200 mbps by NISN at LaRC.



2) to GSFC**2.1) to NPP, GES DISC, etc.**Ratings: NOAA → NPP SD3E: Continued **Good**NSIDC → GES DISC: Continued **Excellent**LDAAC → GES DISC: Continued **Excellent**JPL → GSFC: Continued **Excellent**

Web Pages:

http://ensight.eos.nasa.gov/Missions/NPP/GSFC_SD3E.shtml<http://ensight.eos.nasa.gov/Organizations/production/GDAAC.shtml>http://ensight.eos.nasa.gov/Organizations/production/ESDIS_PTH.shtmlhttp://ensight.eos.nasa.gov/Missions/icesat/GSFC_ISIPS.shtml**Test Results:**

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NOAA-PTH → NPP-SD3E-OPS1	819.3	776.5	659.4	305.4	836.6
EROS LPDAAC → GES DISC	259.2	179.6	106.9		
EROS PTH → GSFC-ESDIS PTH	923.0	569.8	167.5		
JPL-PODAAC → GES DISC	670.2	305.5	82.5	3.65	
JPL-TES → GSFC-NISN	574.5	365.3	46.2		
LaRC ASDC → GES DISC	936.0	933.5	897.0	2.10	
LARC-ANGe → GSFC-ESDIS PTH	936.6	932.3	889.1		
NSIDC DAAC → GES DISC	878.0	817.1	707.0	1.30	
NSIDC DAAC → GSFC-ISIPS (scp)	31.8	31.0	26.9		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
NSIDC → GSFC	CY '12 –	0.017	0.6	Excellent
LaRC ASDC → GES DISC	CY '12 –	0.6	0.4	Excellent
JPL → GSFC combined	CY '12 –	0.57	3.2	Excellent
NOAA → NPP SD3E	CY '12 –	522.3	615.6	Good

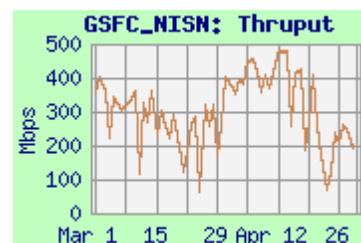
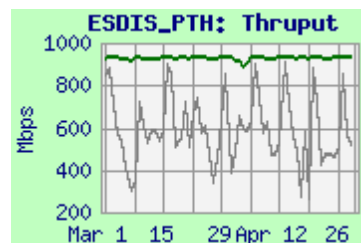
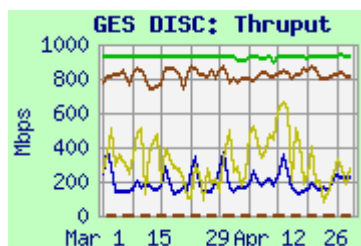
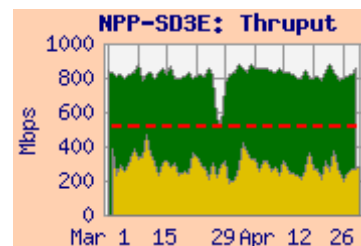
Comments:

2.1.1 NOAA → NPP-SD3E: Performance from **NOAA-PTH** to GSFC NPP-SD3E-OPS1 was very steady at over 800 mbps, limited by the Gig-E interface on the NOAA side test machine (the circuits are all 10 gbps). User flow was close to usual, and close to the requirement without contingency.

2.1.2 EROS LPDAAC, EROS-PTH → GSFC: The throughput for tests from **EROS LPDAAC** to GES DISC and from **EROS-PTH** to ESDIS-PTH were again noisy, with the PTH's getting better results than the DAACs.

2.1.3 JPL → GSFC: Thruput from **JPL-PODAAC** is noisy but stable. Note that JPL → EBnet flows take Internet2 instead of NISN, based on JPL routing policies. With the modest requirement the rating remains **Excellent**. The 3.3 mbps average user flow was close to typical and the old requirement, and well above the new [reduced] requirement.

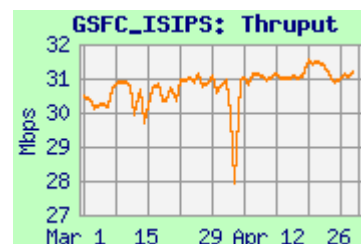
Testing from **JPL-TES** to GSFC-NISN is routed via NISN PIP, and shows the capability of that network.



2.1) to NPP, GES DISC continued.

2.1.4 LaRC → GSFC: Performance from **LaRC ASDC** to GES DISC was very stable this month, as it has been since the host upgrade at ASDC in February. Thruput from **LaRC ANGe** to ESDIS-PTH was also stable. Both results remained way above 3 x the modest requirement, so the rating continues as **Excellent**. The user flow this month was a bit higher than last month – about 3.5 x the requirement.

2.1.5 NSIDC → GSFC: Performance from **NSIDC** to GES DISC improved in October 2013, due to an upgraded host at NSIDC, dropped in January due to NSIDC routing issues, and recovered in February. It remained way above the tiny requirement, so the rating remains **Excellent**. The user flow was again well above both the old and lower new requirement. Thruput to **GSFC-ISIPS** using SCP remains well above the requirement.

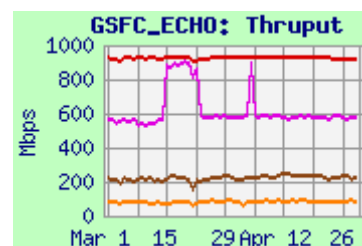


2.2 GSFC-ECHO: EOS Metadata Clearinghouse

Web Page: http://ensight.eos.nasa.gov/Organizations/gsfc/GSFC_ECHO.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	n/a	n/a	n/a
EROS LPDAAC ftp	n/a	n/a	n/a
GES DISC	937.9	929.1	893.3
GES DISC ftp	608.4	580.2	531.6
LaRC ASDC DAAC	n/a	n/a	n/a
NSIDC DAAC	250.0	229.6	189.7
NSIDC DAAC ftp	114.8	84.2	38.9



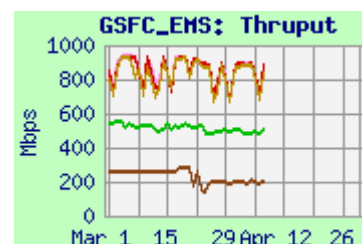
Comments: Performance was mostly stable from **GSFC** and **NSIDC**. FTP performance is mostly limited by TCP window size – especially from sites with long RTT. Testing from **EROS LPDAAC** stopped working in December, and from **LaRC ASDC** in early January due to host upgrades – firewall rules are in place – host access has been requested.

2.3 GSFC-EMS: EOS Metrics System

Web Page: http://ensight.eos.nasa.gov/Organizations/gsfc/GSFC_EMS.shtml

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
EROS LPDAAC	n/a	n/a	n/a
ESDIS-PTH	907.5	879.9	729.2
GES DISC	920.0	888.4	705.1
LARC ASDC	532.3	490.6	389.7
MODAPS-PDR	921.4	877.0	102.8
NSIDC-SIDADS	275.0	196.5	167.8



Comments: Testing is performed to GSFC-EMS from the above nodes, iperf only. The test server went down in early April for maintenance – restored in May. Testing from **EROS LPDAAC** stopped working in December with the host upgrade at EROS – fixed in May. Performance was mostly stable from other sources.

3) JPL:

3.1) GSFC → JPL:

Ratings: GSFC → JPL: Continued **Excellent**

Test Results: (additional results on next page)

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NPP-SD3E-OPS1 → JPL-AIRS	709.3	345.9	188.1	99.0	357.0
GSFC-GES DISC → JPL-AIRS	433.6	364.2	205.2		
ESDIS-PTH → JPL-AIRS	594.1	312.1	151.2		
GSFC-NISN → JPL-AIRS	329.5	106.8	35.7		
NPP-SD3E-OPS1 → JPL-Sounder	709.7	351.9	213.1		
GSFC-NISN → JPL-Sounder	422.0	186.7	59.2		
ESDIS-PTH → JPL-MLS	498.0	365.6	168.1		
GSFC-NISN → JPL-MLS	502.6	309.4	113.8		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → JPL Combined	CY '12-	63	116.7	Excellent
GSFC → JPL AIRS	CY '12-	40	98	Excellent
GSFC NPP → JPL Sounder	CY '12-	15	15	Excellent
GSFC → JPL MLS	CY '12-	1.0	2.1	Excellent

Comments:

3.1.1 AIRS , Overall:

http://ensight.eos.nasa.gov/Missions/aqua/JPL_AIRS.shtml

The requirements were switched in June '12 to use the requirements database, instead of Handbook v1.4.3 previously. This resulted in a 46% decrease in the overall requirement.

The AIRS tlcf node was moved to a new location in June 2013. When testing resumed about 2 weeks later, thrupt was significantly lower from all sources. But the median integrated thrupt from **NPP-SD3E-OPS1** remained above 3 x the reduced AIRS requirement, so the AIRS rating remains **Excellent**.

3.1.2 The JPL overall rating is also based on the **NPP-SD3E-OPS1** to JPL AIRS thrupt, compared with the sum of all the GSFC to JPL requirements. The median thrupt remained above 3 x this requirement, so the overall rating remains **Excellent**. The average user flow this month was 57% above the requirement.

3.1.3 NPP to JPL Sounder:

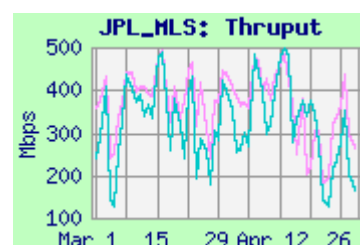
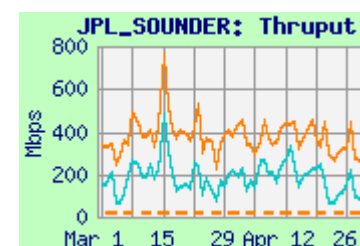
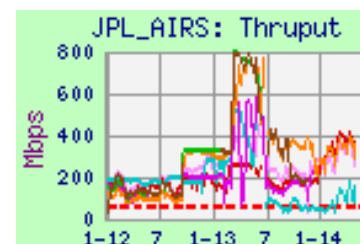
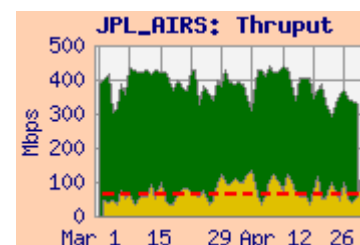
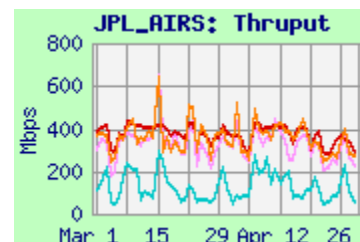
http://ensight.eos.nasa.gov/Missions/NPP/JPL_SOUNDER.shtml

Performance for this month from **NPP-SD3E-OPS1** and **GSFC-NISN** had large diurnal variation, but was mostly stable.

3.1.4 MLS:

http://ensight.eos.nasa.gov/Missions/aura/JPL_MLS.shtml

Thruput from both **ESDIS-PTH** and **GSFC-NISN** were noisy this month. Both were way above the modest requirement, so the rating remains **Excellent**.



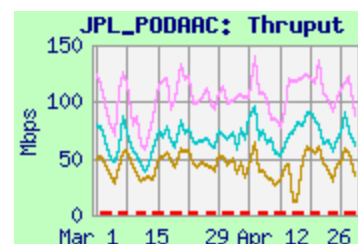
3.1) GSFC → JPL: continued

Test Results: continued

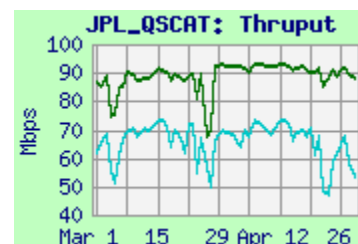
Source → Dest		Medians of daily tests (mbps)		
		Best	Median	Worst
ESDIS-PTH → JPL-PODAAC		149.0	106.8	54.9
GSFC-NISN → JPL- PODAAC		101.4	71.6	35.7
MODAPS-PDR → JPL-PODAAC		69.0	43.0	11.6
ESDIS-PS → JPL-QSCAT		92.9	91.6	77.6
GSFC-NISN → JPL-QSCAT		74.2	67.4	47.5
GSFC-EDOS → JPL-SMAP	1 stream	93.9	27.7	5.3
	6 streams	449.5	144.2	34.9
GSFC-EDOS → JPL-OCO2	1 stream	92.9	33.8	7.4
	6 streams	445.1	155.8	43.7

3.1.5 PODAAC:
http://ensight.eos.nasa.gov/Organizations/production/JPL_PODAAC.shtml

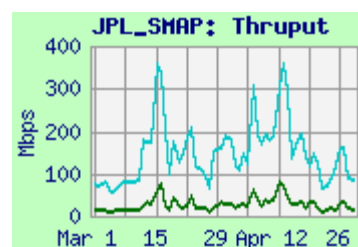
There is no longer a requirement from GSFC to JPL PODAAC in the database. Performance was a bit noisy but mostly stable; thruput was way above the previous 1.5 mbps PODAAC requirement.

**3.1.6 QSCAT:**
http://ensight.eos.nasa.gov/Organizations/production/JPL_QSCAT.shtml

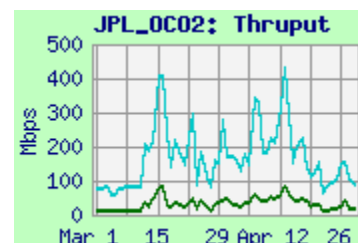
There is no longer a requirement from GSFC to JPL QSCAT in the database. Thruput from ESDIS-PS and GSFC-NISN to QSCAT was pretty stable, and remains well above the modest previous 0.6 mbps requirement.

**3.1.7 SMAP:**
http://ensight.eos.nasa.gov/Organizations/daac/JPL_SMAP.shtml

There is no requirement from GSFC to JPL SMAP in the database [yet]. Testing from EDOS to SMAP is done using both a single stream and 6 streams. Performance improved in early March, similar to the performance from EDOS to many other sites.

**3.1.8 OCO2:**
http://ensight.eos.nasa.gov/Organizations/daac/JPL_OCO2.shtml

There is no requirement from GSFC to JPL OCO2 in the database [yet]. Testing from EDOS to OCO2 is done using both a single stream and 6 streams. Performance improved in early March, similar to the performance from EDOS to many other sites.



3.2) LaRC → JPLRating: Continued **Excellent**

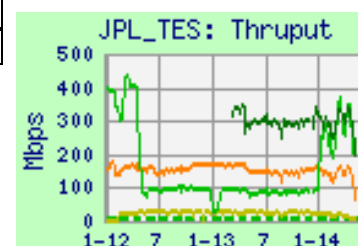
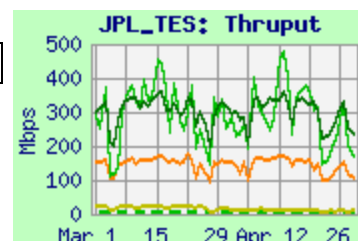
Web Pages:

http://ensight.eos.nasa.gov/Organizations/production/JPL_TES.shtmlhttp://ensight.eos.nasa.gov/Missions/terra/JPL_MISR.shtmlhttp://ensight.eos.nasa.gov/Organizations/production/JPL_PTH.shtml**Test Results:**

Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
LaRC ASDC → JPL-TES	470.3	278.6	94.3	
LaRC ANGE → JPL-TES	400.5	310.7	176.5	
LaRC PTH → JPL-TES	176.1	151.5	66.3	
LaRC PTH → JPL-TES sftp	24.2	11.2	5.8	
LaRC ASDC → JPL-MISR	38.5	25.0	11.8	1.9
LaRC PTH → JPL-MISR	30.6	20.8	9.7	
LaRC ANGE → JPL-PTH	87.8	85.9	78.1	15.2

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
LaRC → JPL-Combined	CY '12 –	83.5	69.3	Excellent
LaRC ASDC → JPL-MISR	CY '12 –	78.1	62.3	Bad
LaRC ASDC → JPL-TES	CY '12 –	5.5	7.0	Excellent

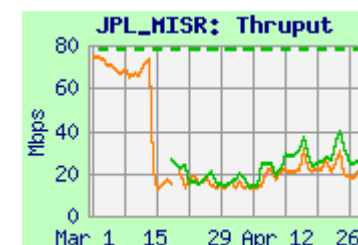
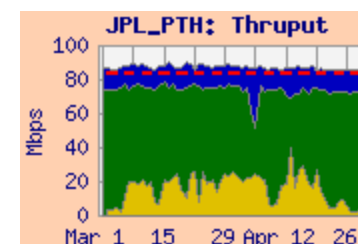


3.2.1 LaRC → JPL (Overall, TES): Performance from LaRC ASDC to JPL-TES improved dramatically in early January with the ASDC node upgrade! It is now similar to the thruput from LaRC ANGe, and that previously seen from LaRC ASDC until April 2012. The median thruput remains above 3 x the combined requirements, so the Overall rating remains **Excellent**.

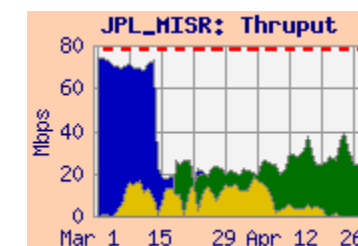
The median thruput also remained well over 3 x the TES requirement, so the TES rating remains **Excellent**. User flow to TES is very low.

The JPL-PTH integrated graph shows the overall LaRC to JPL user flow (vs. the overall requirement). The user flow this month was below that from last month and the requirement.

Performance from LaRC PTH to JPL-TES is stable, but is limited to 200 mbps by agreement with CSO / NISN.



3.2.2 LaRC → JPL-MISR: Testing from the upgraded LaRC ASDC node was unblocked last month; results from ASDC to MISR are similar to that from LaRC PTH. Thruput from LaRC to JPL MISR is limited by the Fast-E connection to the MISR node. Thruput to MISR from both sources dropped severely in March, after improving in December. The median integrated thruput from LaRC PTH was below 1/3 of the MISR requirement, so the MISR rating remains **Bad**. User flow decreased this month, now averaging 2.4% of the requirement (was 13% last month). Note that the user flow peak was BEFORE the thruput dropped, suggesting that the user flow is not the cause of the thruput drop.



The LaRC → JPL Overall rating is not based on this result, however, since it not indicative of the capability of the network.

4) LaRC

4.1) JPL → LaRC

Rating: Continued **Excellent**

Web Page: http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

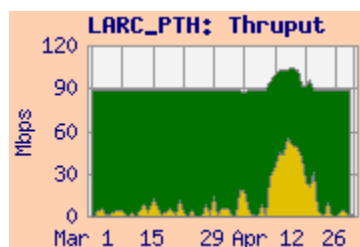
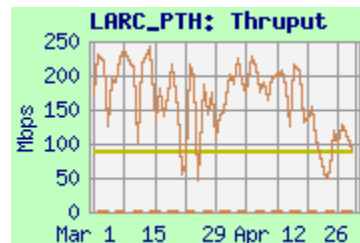
Source → Dest	Medians of daily tests (mbps)			User Flow
	Best	Median	Worst	
JPL-PTH → LaRC PTH	88.9	88.7	88.4	15.0
JPL-TES → LaRC PTH	288.6	168.4	33.4	

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
JPL → LaRC	CY '12 –	1.1	1.5	Excellent

Comment: This requirement is primarily for TES products produced at the TES SIPS at JPL, being returned to LaRC for archiving. The route from JPL to LaRC is via NISN PIP. This month the thrupt from JPL-TES was again noisy but remained much higher than the requirement; the rating remains **Excellent**. The user flow this month peaked, well above the 1.1 mbps requirement.

Thruput from JPL-PTH to LaRC-PTH has been stable at the higher of its two common states (88 mbps) since January 2013, when it switched from the lower of its two common states (60 mbps). It is limited by a Fast-E interface on JPL-PTH (upgrade in progress).



4.2) GSFC → LaRC:**Rating:** Continued **Excellent**

Web Pages : <http://ensight.eos.nasa.gov/Organizations/production/LARC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/LARC_ANGe.shtml
http://ensight.eos.nasa.gov/Organizations/production/LARC_PTH.shtml

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GES DISC → LaRC ASDC	935.5	933.8	598.2	83.1	934.7
GSFC-EDOS → LaRC ASDC	924.9	895.5	311.2		
ESDIS-PTH → LaRC-ANGe	915.2	837.8	360.0		
GSFC-NISN → LaRC-ANGe	904.8	852.4	573.3		
GES DISC → LaRC-PTH	615.1	601.4	423.3		
GSFC-NISN → LaRC-PTH	624.8	613.5	591.4		
NPP-SD3E → LaRC-PTH	644.0	626.6	439.8		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → LARC (Combined)	CY '12 –	52.2	31.3	Excellent

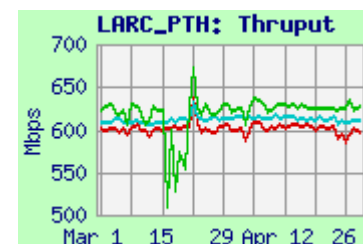
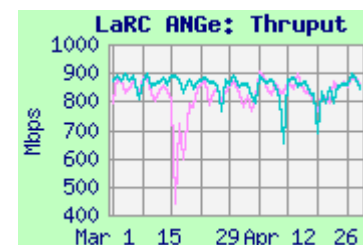
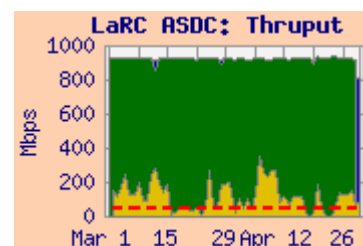
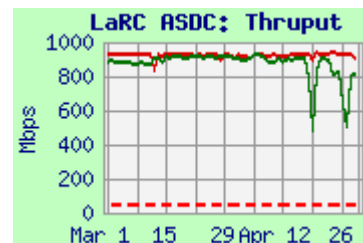
Comments:

GSFC → LaRC ASDC: Thruput from **GES DISC** to LaRC ASDC DAAC remained well above 3 x the increased combined requirement, close to the circuit limitation, so the rating remains **Excellent**. Thruput to ASDC from **GSFC-EDOS** was slightly lower, but improved a bit in mid March along with other tests from EDOS.

As seen on the integrated graph, the 83 mbps average user flow this month was above typical and the requirement.

GSFC → ANGe (LaTIS): Testing to ANGe ("Bob") from both **ESDIS-PTH** and **GSFC-NISN** was stable, close to the circuit limitation. (Note the expanded scale on the graph).

GSFC → LaRC-PTH: Testing to LaRC-PTH from **GES DISC**, **NPP-SD3E**, and **GSFC-NISN** was stable, but below the performance to ASDC and ANGe.



5) Boulder CO sites:

5.1) NSIDC:

Ratings: GSFC → NSIDC: Continued **Excellent**
 JPL → NSIDC: Continued **Excellent**
 GHRC → NSIDC: Continued **Excellent**

Web Pages: <http://ensight.eos.nasa.gov/Organizations/production/NSIDC.shtml>
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_SIDADS.shtml
http://ensight.eos.nasa.gov/Organizations/production/NSIDC_PTH.shtml

Test Results: NSIDC S4PA

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
MODAPS-PDR → NSIDC DAAC	579.7	542.7	232.4	2.69	542.7
GES-DISC → NSIDC DAAC	625.2	603.9	460.0		
GSFC-EDOS → NSIDC DAAC	620.8	608.5	334.4		
ESDIS-PTH → NSIDC DAAC	504.4	503.6	457.7		
GSFC-ISIPS → NSIDC (iperf)	623.8	620.8	566.0		
JPL PODAAC → NSIDC DAAC	535.6	455.5	177.4		
GHRC → NSIDC DAAC (nuttcp)	43.0	13.8	2.9	0.04	
GHRC → NSIDC DAAC (ftp pull)	56.9	22.2	3.8		

Requirements:

Source → Dest	Date	Mbps	Prev	Rating
GSFC → NSIDC	CY '12 –	8.42	27.6	Excellent
JPL → NSIDC	CY '12 –	0.16	0.2	Excellent
GHRC → NSIDC	CY '12 –	0.46	0.5	Excellent

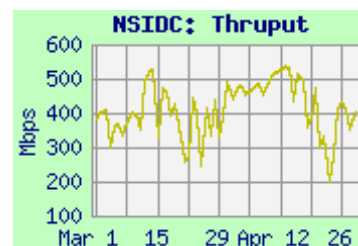
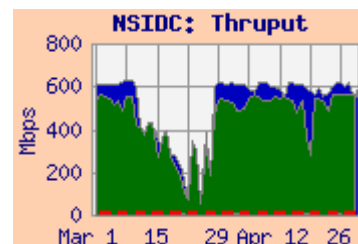
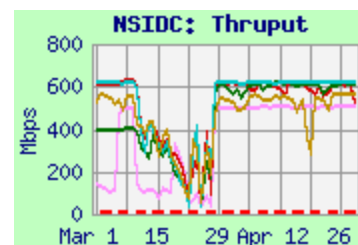
Comments: All Colorado sites experienced serious incoming performance degradation from approximately March 8 to 28. The problem was diagnosed as related to a 100G Brocade switch problem. Apparently this was a well known bug, (FPGA code flipped bytes in the TCP payload) and went unpatched for a long time. It was impacting all Front Range members coming from I2/Chicago.

5.1.1 GSFC → NSIDC S4PA: The rating is based on testing from the **MODAPS-PDR** server to the NSIDC DAAC. The requirement was reduced in May '09 from 34.5 mbps (and was 64 mbps in April '08).

The integrated thrupt from **MODAPS-PDR** was much less noisy (max : min ratio was 2.5 : 1 compared to 10.1 : 1 last month), and the median thrupt remained well above 3 x the requirement, so the rating remains **Excellent**. The 2.69 mbps average user flow was below the requirement without contingency.

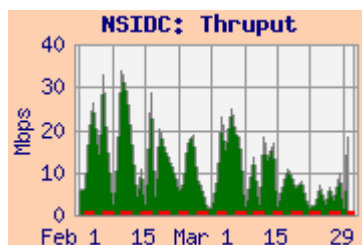
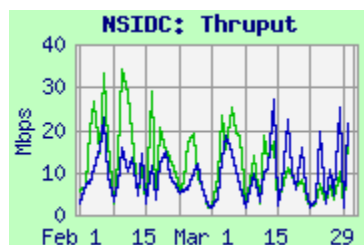
Testing from **GES-DISC**, and all other sources was also less noisy, with reduced max : min ratios. Testing from **GSFC-EDOS** and **GSFC-ISIPS** was retuned in mid January with parameters similar to **MODAPS**, and achieved similar results.

5.1.2 JPL PODAAC → NSIDC S4PA: This requirement was reduced from 1.34 mbps in May '09. Thrupt from **JPL PODAAC** to NSIDC is well above the requirement; the rating remains **Excellent**. Note the expanded scale on the graph. JPL access NSIDC from the west, and was unaffected by the problem from the east, above.



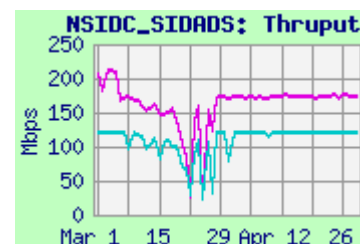
5) Boulder CO sites (Continued):

5.1.3 GHRC, GHRC-ftp → NSIDC S4PA: GHRC (NSSTC, UAH, Huntsville, AL) sends AMSR-E data to NSIDC via Internet2. The median integrated throughput remained well above 3 x the 0.46 mbps requirement, so the rating remains **Excellent**.



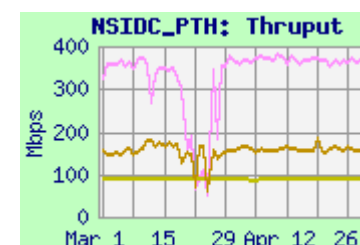
Test Results: NSIDC-SIDADS, NSIDC-PTH

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL → NSIDC-SIDADS	181.0	173.5	160.0
GSFC-NISN → NSIDC-SIDADS	122.1	121.4	103.1
ESDIS-PTH → NSIDC-PTH	407.2	368.3	293.4
MODAPS-PDR → NSIDC-PTH	224.7	157.7	134.6
JPL-PTH → NSIDC-PTH	89.0	88.0	82.2



5.1.4 GSFC → NSIDC-SIDADS: Performance from GSFC-NISN and GSFC-ENPL to NSIDC-SIDADS also affected by the March degradation. Thruput was less noisy this month.

5.1.5 NSIDC-PTH: Thruput from east coast sources to NSIDC-PTH was also affected by the March degradation. Thruput was less noisy this month. JPL-PTH was unaffected, but is limited by its Fast-E connection (upgrade in progress).



5.2) LASP:

Ratings: LASP → GSFC: Continued **Excellent**

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/LASP.shtml>

Test Results:

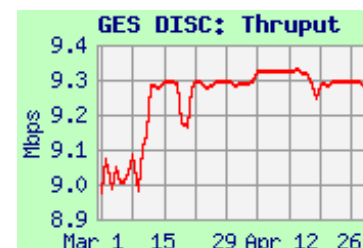
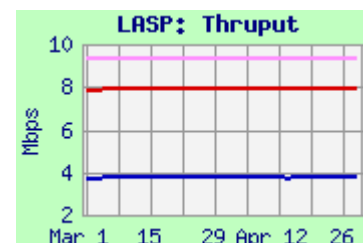
Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
ESDIS-PTH → LASP blue (scp)	3.82	3.78	3.57
ESDIS-PTH → LASP blue (iperf)	9.38	9.37	7.88
GES DISC → LASP blue (iperf)	7.97	7.96	7.10
LASP → GES DISC	9.32	9.30	8.87

Requirement:

Source → Dest	Date	Mbps	Rating
LASP → GES DISC	CY '10 -	0.016	Excellent

Comments: In January '11, LASP's connection to NISN PIP was rerouted to a 10 mbps connection to the NISN POP in Denver; previously it was 100 mbps from CU-ITS via NSIDC.

Iperf testing from GES DISC has been very stable since February 2013, when it improved with the GES DISC firewall upgrade. Iperf and SCP testing from ESDIS-PTH was also very stable, and consistent with the circuit limitation, as was return testing from LASP to GES DISC, rating **Excellent**.

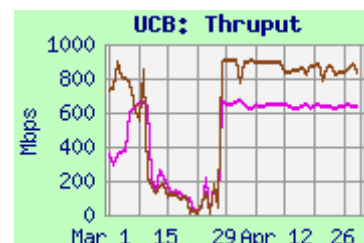


5.3) UCB:

Web Page <http://ensight.eos.nasa.gov/Organizations/daac/UCB.shtml>

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
GSFC-ENPL	691.6	637.5	565.7
GSFC-ESTO	905.7	869.3	590.5



Comments: Testing to the 10 gig connected test node at UCB began failing consistently in mid-May 2013, so testing was switched to a 1 gig test node in mid-June. The route is via Internet2 to FRGP, similar to NCAR. Thruput from both **GSFC-ENPL** and **GSFC-ESTO** was affected by the March degradation, similar to other Colorado destinations, but improved and stabilized in April.

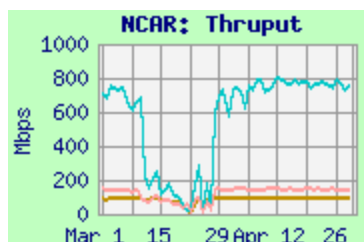
5.4) NCAR:

Ratings: LaRC → NCAR: Continued **Excellent**
 GSFC → NCAR: Continued **Excellent**

Web Pages <http://ensight.eos.nasa.gov/Missions/terra/NCAR.shtml>

Test Results:

Source	Medians of daily tests (mbps)		
	Best	Median	Worst
LaRC PTH	171.2	146.6	121.2
GSFC-ENPL-10G	4370.0	3380.0	1760.0
GSFC-ENPL-FE	94.6	94.4	94.0
GSFC-NISN	842.6	763.0	405.3

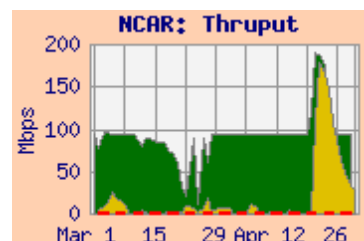
**Requirement:**

Source	Date	Mbps	Prev	Rating
LaRC	CY '12 -	0.044	0.1	Excellent
GSFC	CY '12 -	0.111	5.0	Excellent

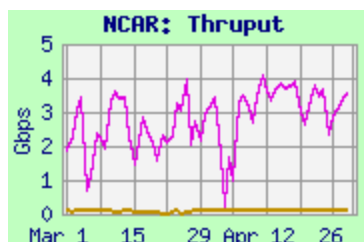
Comments: NCAR has a SIPS for MOPITT (Terra, from LaRC), and has MOPITT and HIRDLS (Aura, from GSFC) QA requirements.

Testing was switched to NCAR's 10 gigabit capable PerfSonar server in March '12 – testing was discontinued from **LaRC ASDC** at that time; testing from **LaRC-PTH** continued.

From LaRC: Thruput from **LaRC-PTH** was very noisy, and was affected by the March degradation, similar to other Colorado destinations, but stabilized in April. The median remained well above 3 x the tiny requirement, so the rating remains **Excellent**. Note that outflow from **LaRC-PTH** is limited to 200 mbps by agreement with CSO / NISN.



From GSFC: From **GSFC-NISN**, the route is via NISN to the MAX (similar route as from **LaRC-PTH**). Thruput was very noisy last month, and was affected by the March degradation, similar to other Colorado destinations, but stabilized in April. The median was well above 3 x the requirement, so the rating remains **Excellent**. There was a peak user flow from **GSFC-EBnet** this month, averaging 33.7 mbps, waaaaay above the revised requirement, and the previous requirement as well.



From **GSFC-ENPL-10G**, with a 10 Gig-E interface, and a 10 gig connection to MAX, performance to NCAR's 10 Gig PerfSonar node is also noisy, and gets over 4 gbps on peaks.

6) Remote Sensing Systems (RSS):

Ratings: JPL → RSS: Continued

Excellent

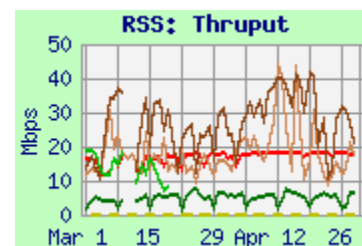
RSS → GHRC: Continued

Excellent

Web Page <http://ensight.eos.nasa.gov/Missions/aqua/RSS.shtml>

Test Results:

Source → Dest	Medians of daily tests (mbps)		
	Best	Median	Worst
JPL PODAAC → RSS (Comcast)	43.6	30.4	6.7
JPL TES → RSS (Comcast)	49.1	17.6	5.5
GSFC-NISN → RSS (Comcast)	18.5	18.1	13.0
GHRC-UAH → RSS (Comcast)	n/a	n/a	n/a
GHRC-NISN → RSS (Comcast)	9.7	5.6	2.0
RSS (Comcast) → GHRC (UAH)	n/a	n/a	n/a
RSS (Comcast) → GHRC (NISN)	3.82	3.17	1.34



Requirements:

Source → Dest	Date	Mbps	Prev	Rating
JPL PODAAC → RSS	CY '12 -	0.16	0.49	Excellent
RSS → GHRC	CY '12 -	0.32	0.34	Excellent

Comments: RSS (Santa Rosa, CA) is a SIPS for AMSR-E (Aqua), receiving L1 data from JAXA via JPL, and sending its processed L2 results to GHRC (aka NSSTC) (UAH, Huntsville, AL). Note that AMSR-E is not operating at this time, so that data is not flowing. However, AMSR2 is operating on JAXA's GCOM-W1 spacecraft, and sending data to RSS (but this is not an EOS requirement).

At the end of March 2012, RSS switched its production node from the NISN SIP circuit (4 x T1s to NASA ARC -- total 6 mbps) to the Comcast circuit, rated at 50 mbps incoming, and 12 mbps outgoing. Testing via the NISN circuit to RSS was discontinued at that time.

JPL → RSS: The median iperf from JPL PODAAC was noisy but higher than last month, and remained well above 3 x the reduced requirement, so the rating from JPL remains **Excellent**.

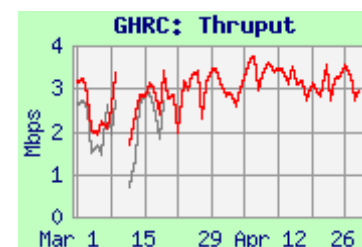
GHRC → RSS: The UAH server at GHRC was retired in March, and testing between RSS and UAH-GHRC is no longer active in either direction. Testing from the NISN server at GHRC was noisy, but stable.

GSFC → RSS: Testing from GSFC-NISN was less noisy this month. Previously, it had degraded around the beginning of June 2013, indicating a peering problem between NISN and Comcast, but recovered at the end of June.

RSS → GHRC: The server at RSS on the Comcast circuit allows "3rd party" testing, as does the server at GHRC. Testing is therefore performed between RSS and GHRC, with a NISN address at GHRC (Testing from RSS to the GHRC UAH address was discontinued in mid March, when the GHRC UAH server was retired).

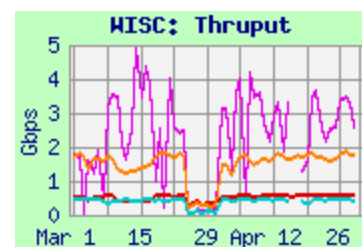
The performance to GHRC-NISN was somewhat noisy, but remained well above 3 x the reduced requirement, so the rating remains

Excellent.

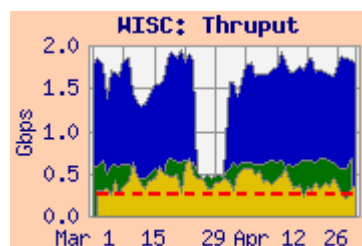


7) Wisconsin:Rating: Continued **Excellent**Web Pages <http://ensight.eos.nasa.gov/Missions/NPP/WISC.shtml>**Test Results:**

Source Node	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
NPP-SD3E	1988.4	1685.0	1251.7	357.2	1707.4
GES DISC	566.6	560.4	544.2		
GSFC ENPL	5997.3	3039.9	62.2		
LaRC ANGe	505.1	441.8	324.1		

**Requirements:**

Source Node	Date	mbps	Prev	Rating
NPP-SD3E	CY'12 -	237.2	237.2	Excellent
GSFC MODAPS	CY'12 -	21.9	16.5	Excellent
GSFC Combined	CY'12 -	259.1	253.7	Excellent
LaRC Combined	CY'12 -	n/a	7.9	n/a



Comments: The University of Wisconsin is included in this Production report due to its function as Atmosphere PEATE for NPP. Wisconsin continues to be an SCF on the MODIS, CERES and AIRS teams.

The Wisconsin 10 gig server was temporarily downgraded to 1 gig from approx 25 March until 2 April.

GSFC: At the end of March 2013, testing from **GSFC-ENPL** was switched to a new 10 gig server at Wisconsin (SSEC), with thruput now typically close to 2 gbps.

User flow was above, but close to the requirement, similar to last month.

Testing from **NPP-SD3E** was also switched to Wisconsin's 10 gig server, in May 2013, with thruput now usually over 1 gbps! The integrated thruput from **NPP-SD3E** remained above the NPP requirement by 3 x, so the NPP rating remains **Excellent**. It was also above the GSFC combined requirement by more than 3 x, so the combined rating also remains **Excellent**.

The route from EBnet at GSFC is via MAX to Internet2, peering with MREN in Chicago.

LaRC: There is no longer a CERES requirement from LaRC to Wisconsin. On 23 April 2013, testing from **LaRC ANGe** was switched to the new SSEC 10 gig server; performance improved at that time. Thruput from **LaRC ANGe** remains well above the previous 7.9 mbps requirement; it would be rated **Excellent**. The route from LaRC is via NISN, peering with MREN in Chicago.

8) KNMI:Rating: Continued **Excellent**Web Pages http://ensight.eos.nasa.gov/Missions/aura/KNMI_ODPS.shtml**Test Results:**

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
OMISIPS → KNMI-ODPS	406.3	274.0	66.9	1.92	274.0
GSFC-ENPL → KNMI-ODPS	635.0	549.3	291.0		

Requirements:

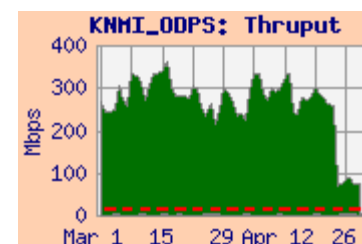
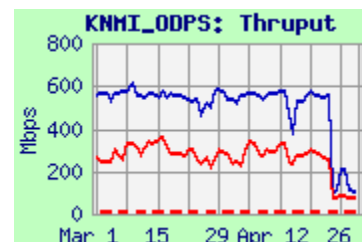
Source Node	Date	mbps	Prev	Rating
OMISIPS	CY'12 -	13.4	0.03	Excellent

Comments: KNMI (DeBilt, Netherlands) is a SIPS and QA site for OMI (Aura). The route from GSFC is via MAX to Internet2, peering in DC with Géant's 2+ x 10 gbps circuit to Frankfurt, then via Surfnets through Amsterdam.

The requirement was increased with the use of the database to 13.4 mbps, a much more realistic value than the previous 0.03 mbps.

The rating is based on the results from **OMISIPS** on EBnet at GSFC to the ODPS primary server at KNMI. **Thruput from both sources was stable until near the end of the month, when it dropped significantly (but remained well above the requirement). The median thruput remains much more than 3 x the increased requirement, so the rating remains **Excellent**.**

The user flow, however, averaged only 1.92 mbps this month, similar to recent months, but only 14% of the revised requirement.



9) JSpace - ERSD:

Ratings: **GSFC** → **ERSD**: Continued **Excellent**
ERSD → **EROS**: Continued **Excellent**
ERSD → **JPL-ASTER-IST**: N/A

Web Page: <http://ensight.eos.nasa.gov/Organizations/production/ERSDAC.shtml>

US ↔ JSpace - ERSD Test Results

Source → Dest	Medians of daily tests (mbps)			User Flow	Integrated
	Best	Median	Worst		
GSFC-EDOS → JSpace-ERSD	387.6	177.4	31.9	3.85	180.1
GES DISC → JSpace-ERSD	93.2	92.0	58.6		
GSFC ENPL (FE) → JSpace-ERSD	85.2	81.7	78.5		
GSFC ENPL (GE) → JSpace-ERSD	484.0	468.3	88.2		
JSpace-ERSD → EROS	280.8	170.1	72.0	4.03	170.1
JSpace-ERSD → JPL-TES	150.2	85.1	32.5		

Requirements:

Source → Dest	CY	Mbps	Prev	Rating
GSFC → JSpace-ERSD	'12 -	6.75	5.4	Excellent
JSpace-ERSD → JPL-ASTER IST	'12 -	0.31	0.31	Excellent
JSpace-ERSD → EROS	'12 -	8.33	8.3	Excellent

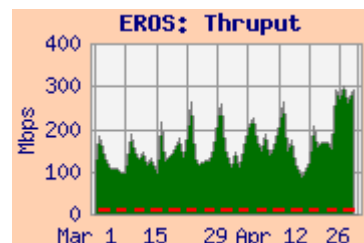
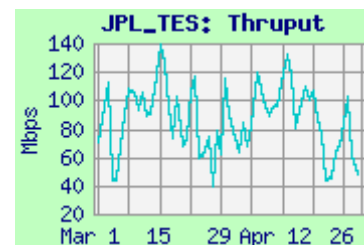
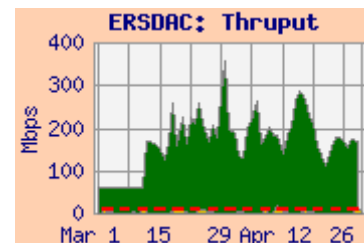
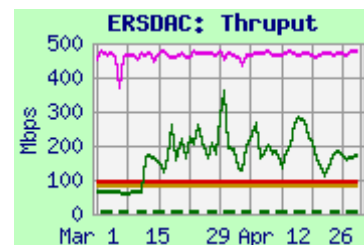
Comments: **GSFC** → **JSpace-ERSD**: The median throughput to JSpace-ERSD from most sources improved in September 2011, when the connection from JSpace-ERSD to Tokyo-XP was upgraded to 1 gbps (from 100 mbps). Peak throughput from **GSFC ENPL** is now often over 400 mbps.

Performance from **GSFC-EDOS** improved in early March, similar to the performance from EDOS to many other sites (median throughput had dropped in late January, due to reconfiguration at EDOS). Throughput remained well above 3 x the reduced requirement, so the rating remains **Excellent**. The user flow was close to normal from GSFC to JSpace-ERSD this month, consistent with the requirement.

JSpace-ERSD → **JPL-ASTER-IST**: The JPL-ASTER-IST test node was retired in October 2012. JPL no longer uses a distinct IST; instead, JPL personnel log in directly to the IST at JSpace-ERSD. As a substitute, testing was initiated from ERSD to a different node at JPL ("TES"). Results to TES were mostly stable, and would be rated

Excellent.

JSpace-ERSD → **EROS**: The throughput improved with retuning in October '11, after the ERSDAC Gig-E upgrade. Throughput remains well above the reduced requirement (was 26.8 mbps previously), so the rating remains **Excellent**. The user flow this month was consistent with the requirement.

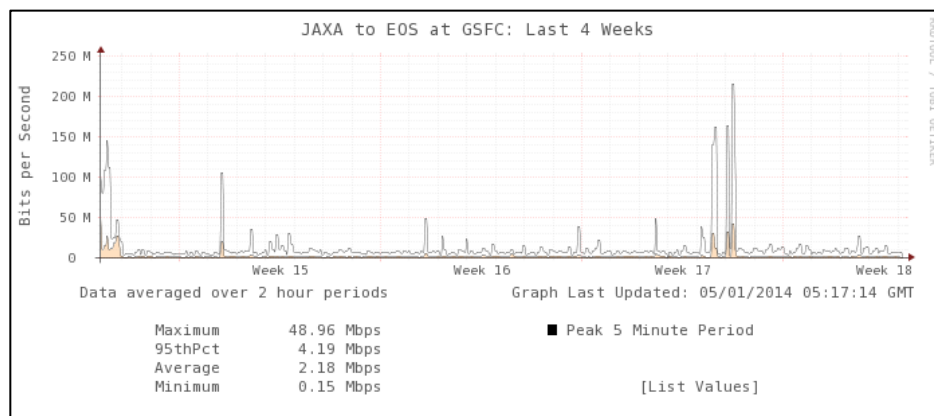
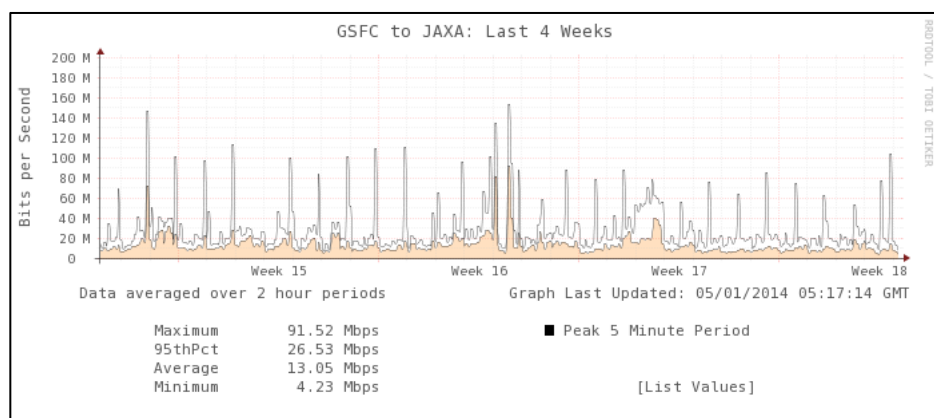


10) US \leftrightarrow JAXARatings: US \rightarrow JAXA: N/AJAXA \rightarrow US: N/A

The JAXA test hosts at EOC Hatoyama were retired on March 31, 2009. No additional testing is planned for AMSR, TRMM, or GPM. All testing to JAXA-TKSC for ALOS was terminated at the end of June '09. JAXA has been requested to restore these tests – primarily for GPM -- but has declined to participate.

However, the user flow between GSFC-EBnet and JAXA continues to be measured. As shown below, the user flow this month averaged 13.05 mbps from GSFC-EBnet to JAXA, and 2.18 mbps from JAXA to GSFC-EBnet.

These values are above the new (database) requirements of 3.36 mbps from GSFC to JAXA, and 1.31 mbps from JAXA back to JPL. However, since no iperf tests are run, the true capability of the network cannot be determined, and therefore no rating is assigned.



After the APAN drop was corrected in December, testing was switched to the Tokyo-XP 10 gig server, with much improved results, well in excess of the JAXA requirements. However, performance dropped below 1 gbps in January until early March.

